



## ANTIMICROBIAL USAGE PATTERN AND OUTCOME OF NEONATAL SEPSIS IN SICK NEWBORN CARE UNIT OF A TERTIARY CARE TEACHING HOSPITAL OF ODISHA

<b>Dr. Paramita Parida</b>	Department of Pharmacology, S.C.B.Medical College, Cuttack, Odisha, India
<b>Dr. Rajlaxmi Upadhyay*</b>	Asst. Professor, Department of Pharmacology, S. C. B. Medical College, Cuttack, Odisha. *Corresponding Author
<b>Dr. Sabita Mohapatra</b>	Department of Pharmacology, S.C.B.Medical College, Cuttack, Odisha, India
<b>Jnanindra nath Behera</b>	Department of Pediatrics, S. C. B. Medical College
<b>Sagar parida</b>	Department of Pediatrics, IMS, SUM Hospital, Bhubaneswar
<b>Manas Ranjan Upadhyay</b>	Department of Pediatrics, S.C.B.Medical College

**ABSTRACT** **Background:** Neonatal sepsis (NS) has been a major cause for mortality, morbidity in neonates of developing countries. It demands prompt diagnosis and treatment. Antimicrobials form the mainstay of treatment in NS. Standard treatment guidelines of Odisha 2018 for antimicrobial use in infectious disease have paved the way for rationalizing antibiotic use, but it needs tailoring according to the prevalent local microbiota and individual patient needs. A periodic surveillance of the microbial etiology and antimicrobial resistance pattern in NS can be useful in rational selection of empirical antimicrobial therapy.

**Aim & Objectives:** Hence this study was designed to analyze utilization pattern of antimicrobial agents in neonatal sepsis and its outcome in SNCU of a tertiary care teaching hospital of Odisha.

**Method:** A prospective observational study was carried out for 6 months on patients of neonatal sepsis admitted to Sick Newborn Care Unit. Data regarding demographic parameters and antimicrobial utilization pattern were collected through a predesigned case record form. Antimicrobial usage quantified as days of therapy (DOT) per 100 patient days. The duration of hospital stay, and final outcome of treatment were assessed.

**Results:** Majority of antimicrobials prescribed in NS were on empirical basis with ampicillin, gentamicin and amikacin in descending order of DOT. There were majority injection prescribed in generic name from EDL. Case fatality rate was 2%.

**Conclusion:** There is need of Antibiotic stewardship and standard treatment guidelines to promote rational use of antimicrobials in NS in our hospital.

**KEYWORDS :** Neonatal sepsis, rational, antibiotic, SNCU.

### INTRODUCTION:

Neonates are vulnerable population exposed to increased risk of death, NMR of Odisha is 37 per 1000 live births in 2013 acc. to SRS<sup>1</sup>. The major causes of newborn deaths in India according to UNICEF 2019<sup>2</sup> are Prematurity & Preterm (35%). Neonatal Sepsis is preventable. But, despite advances in critical care, incidence of neonatal Sepsis is high i.e 24 per 1000 live birth (UNICEF 2019)<sup>2</sup>. Neonatal Sepsis can be classified as<sup>3</sup> Early Onset Neonatal Sepsis (EONS) which develop within 72 hrs of life & Late Onset Neonatal Sepsis (LONS) develop after 72 hrs of life. The incidence of EONS is 10 times higher in ELBW & Prematurity<sup>4</sup>, hence prophylactic antibiotics are to be given to them as per guidelines. It includes various systemic infections like Septicaemia, Meningitis, Pneumonia, Arthritis & UTI. Prompt management like early diagnosis, prompt & rational use of antimicrobial agents & good supportive hospital care. Antimicrobials are the key drugs used for neonatal sepsis. They should be administered judiciously because of Pharmacokinetic & Pharmacodynamic variations, increase risk of adverse drug reactions and drug-drug interactions.

National Treatment Guidelines for AMA Use in neonatal sepsis according to govt. of odisha health & family welfare 2018 steers the clinicians for prescribing antimicrobials. But Evidence of Local Practice Pattern is very limited.

### MATERIALS AND METHODS:

This is a prospective observational study was carried out in SNCU of Pediatric Department of SCB MCH, Cuttack, Odisha, India, for a period of 6 months. This protocol was approved by Institutional Ethics Committee.

### Inclusion Criteria:

Diagnosed cases of neonatal sepsis as per the IMNCI criteria.

### Exclusion Criteria:

Neonatal sepsis patient with AIDS infected mother, septicemia due to viral/fungal infection, congenital anomaly, physiological jaundice & hypoxicemic ischemic encephalopathy are excluded from study.

### Study procedure:

A total of 100 sepsis screen positive cases were enrolled in this study. Written informed consent was obtained from the parents/guardians. Data collected in a predesigned case record form, from hospital record like serial number, age, birth weight, gender, gestational age, antibiotics used were recorded. Data regarding antimicrobial use, dosage form, route of administration, duration of treatment as per Cloherty Manual of Newborn Care. The patients were followed –up daily during their hospital stay to note if there any change of antibiotics and about Outcomes in terms of cured, LAMA (Leave Against Medical Advice) or death.

### RESULTS

Distribution of neonates with neonatal sepsis

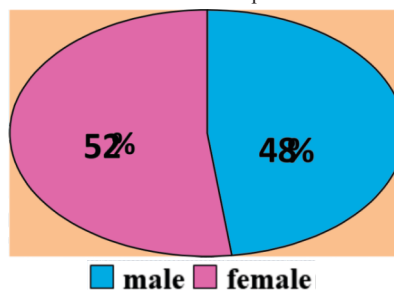


Fig 1. Genderwise

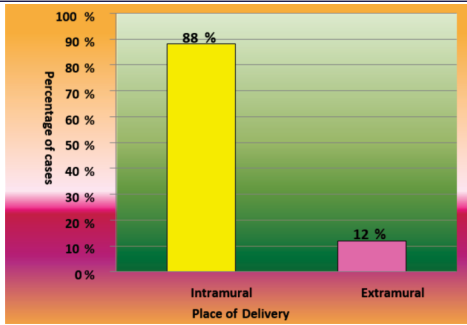


Fig 2. Neonatal Sepsis among Intramural & Extramural Pts

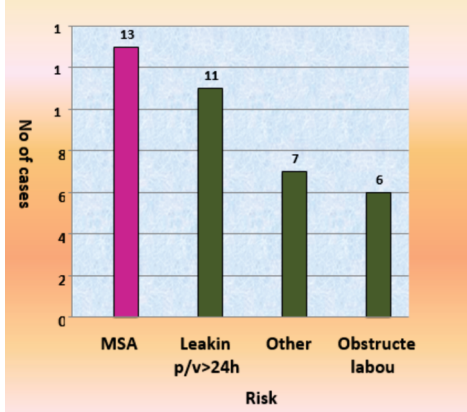


Fig 3-Maternal risk factors a/w use of antibiotics

Table 1- Type of Delivery

Cases	% age of cases
Normal Vaginal Delivery	41%
Cesarean section	59%

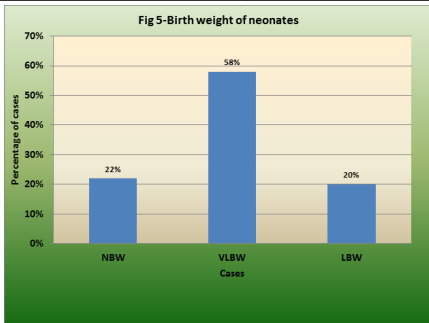


Fig 6-Type of Neonatal sepsis

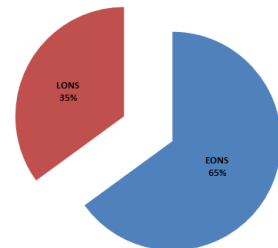


Fig 7-Clinical profile of cases with neonatal sepsis & antibiotics used

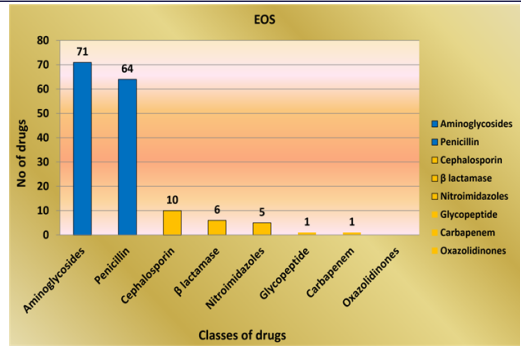
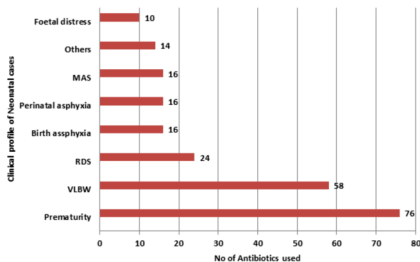


Fig 8. EONS - Classes of Antibiotics Prescribed

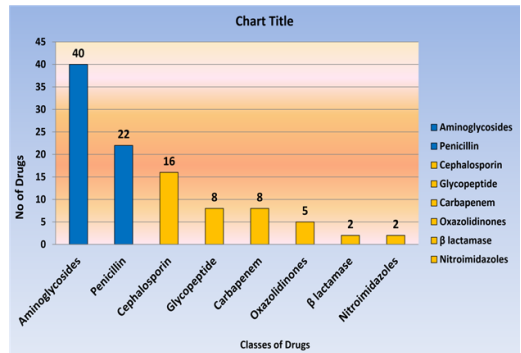


Fig 9. LONS - Classes of Antibiotics Prescribed

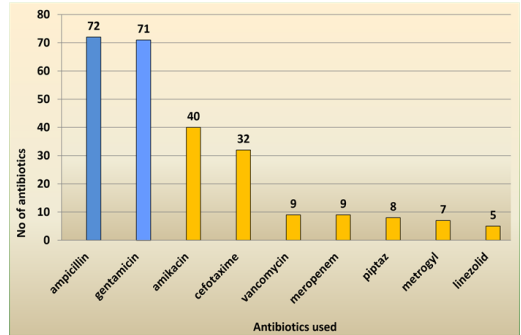


Fig 10. Antibiotics used in Neonatal Sepsis

Table 2. Quantification of Antibiotics Used

Name of Antibiotic	Dot	Do	Percentage
Ampicillin	400	29	26%
Gentamicin	337	24.2	22%
Amikacin	246	17.6	16%
Cefotaxime	197	14.16	13%
Vancomycin	128	9.2	8%
Meropenem	77	5.53	5%
Linezolid	60	4.31	4%
Piperacillin Tazobactam	45	3.23	3%
Metrogl	38	2.73	3%

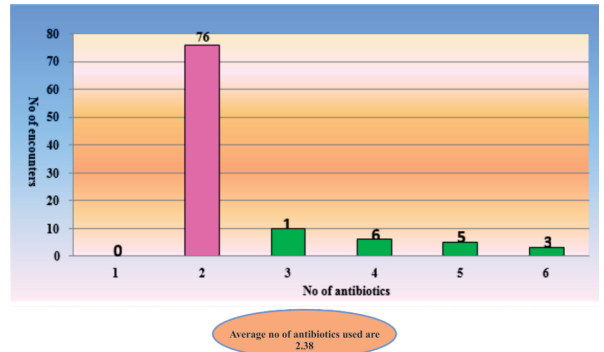


Fig 11. No of Antibiotics prescribed in Neonatal Sepsis

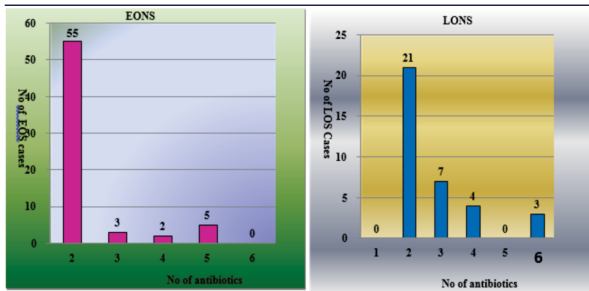


Fig 12. No. of Antibiotics prescribed in Neonatal Sepsis

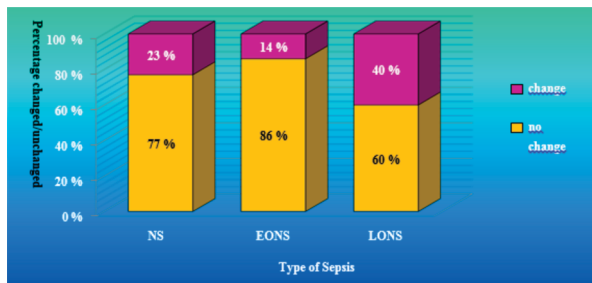


Fig 13. Change in Antibiotic on basis of developing New Symptoms & No Response

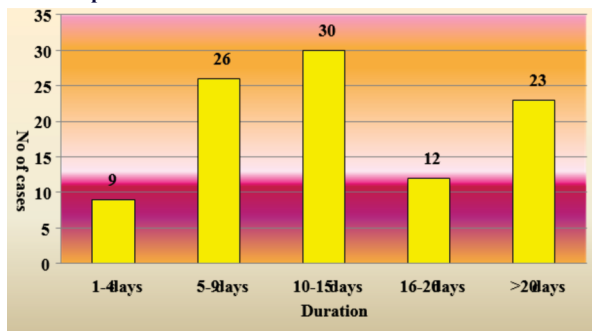


Fig 14. Duration of Hospital Stay

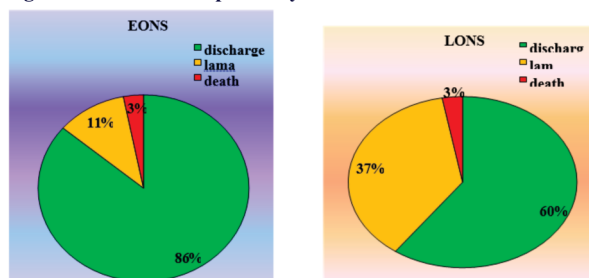


Fig 15. Outcome of Patients with NS

Table -3 Comparison between outcomes of neonatal profile with Suspected Sepsis

Parameter	Variable	Discharge successfully	LAMA/Death	P-value
Onset of sepsis	EONS	86%	14%	<0.01
	LONS	60%	40%	

**DISCUSSION**

In our study, females were more in number than males (52% vs 48%). In 37%, maternal risk factors are the cause of antibiotic use in neonates. MSFAF was most common in our study, in contrast to that by Ahmed et al where PROM & chorioamnionitis as major risk factors<sup>5</sup>. More of the Neonates with Sepsis were born by C/S than NVD (not significant), in contrast to study done in Raipur (inadequate aseptic measures at C/S surgery). VLBW were more as compared to Normal birth weight(58% vs 22%). Incidence of EONS (65%) was more than LONS (35%), similar to study by Shankar et.al, in contrast to study conducted in Tanzania. Most common indication for antibiotic use are Prematurity & VLBW due to poor immune status similar to findings of Suryawanshi et. al, Galhotra et. al, & Shinde et. Al & Polin et.al.<sup>7,8</sup> Ampicillin + Aminoglycoside (Amikacin/Gentamicin) was the

preferred combination for empirical antibiotic therapy in both EONS & LONS. The DOT of the most commonly used antimicrobial i.e. Ampicillin was 29 DOT/100PD, Gentamicin & Amikacin are 24.2 & 17.6 per 100 PD, similar to study done by Scout<sup>9</sup>. The empirical antibiotic selected are from National Treatment Guidelines 2016 for management of neonatal sepsis.<sup>10</sup> All antibiotics were given IV in generic name & chosen from EDL (Govt of Odisha H & FW)2018.<sup>11,12</sup>. In maximum cases 2 antibiotics prescribed per prescription, both in EONS & LONS, similar to that observed by Vaniya et. al & Schellack et.al.<sup>12</sup> Average no antibiotics used in NS are 2.38. EONS(2.49) & LONS(2.86), which is statistically significant (p<0.01). There was change in the antimicrobial regimen in 23% cases only including both EONS & LONS on basis of no response or development of new symptoms. Mean duration of hospital stay is 14 days. Majority of cases were cured, which was significantly greater than those who LAMA or died. Case fatality rate is 3% in contrast to study done by singh et.al where it

**CONCLUSION**

Aminoglycosides & Penicillin are more frequently used in EONS & LONS. Gentamicin & Ampicillin were most often prescribed. On Quantification, Ampicillin has highest days of therapy. All antibiotics given IV from EDL in generic name. In maximum cases 2 number of antibiotics were given. Majority of neonatal patients were cured and discharge. More such studies are required to formulate neonatal antibiotic usage protocol to prevent antibiotic resistance and better outcome.

**REFERENCES**

1. SRS-2013 Data, National Health Mission, HFW Govt. of Odisha
2. UNICEF 2019 Data.
3. Shinde S, Polin, B. Clinicobacteriological profile of neonatal septicaemia in a tertiary care hospital.
4. Meharban Singh, Care of the Newborn, Revised 8th edition
5. Leela KV, Narayanababu R, Sugunya, Venkatamadhup, Deepa RR. Study of Bacterial profile in neonatal sepsis and their antibiotic sensitivity pattern in a tertiary care hospital . Int J Curr Microbiol App Sci.2016;5(6):511-21
6. Shaw CK, Shaw P, Malla T, Malla K. The clinical spectrum and outcome of neonatal sepsis in a NICU of a tertiary care teaching hospital in Western Nepal :January 2000 to December 2005- Aretrospective study
7. Garg D, Agarwal N. Aetiology and presentation of neonatal septicaemia at tertiary care hospital of Southern Rajasthan. Int J Med Sci Edu.2014;1:12-20
8. Kayange N, Kamugisha E, Mwizambolya DL, Jeremiah S, Mshana SE. Predictors of positive blood culture and deaths among neonates with suspected neonatal sepsis in a tertiary hospital, Mwanza Tanzania. BMC Pediatr.2010;10:39
9. Suryawanshi S, Pandit V, Suryavanshi P, Panditrao A. Antibiotic prescribing pattern in a tertiary level NICU. J Clin Diagn Res 2015;9
10. Galhotra S, Gupta V, Singh Bains H, Chhina B. Clinicobacteriological profile of neonatal septicaemia in a tertiary care hospital. J Mahatma Gandhi Inst Med Sci 2015;17:148-52
11. Cloherty Manual of Neonatal Care, 7th edition.
12. Vaniya HV, Agrawal JM, Patel NM, Jadav SP et al. Antimicrobial drug utilization pattern in Neonatal sepsis in a tertiary care hospital . Journal of Clinical & Experimental Research.2014;2(2):110-14
13. WHO Model List of Essential Medicines for Children(2018)
14. National treatment guidelines 2016